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(54) PRINTING UP TO END OF PRINTING PAPER WITHOUT STAINING  
PLATEN

(57)Abstract:

PROBLEM TO BE SOLVED: To suppress buildup of a solidified ink in a groove of a platen when printing is to be carried out up to an end of a printing paper.

SOLUTION: The groove set to the platen for receiving ink discharged other than on a printing medium is provided with an ink suction mechanism for sucking the ink. Buildup of the solidified ink to an ink absorber can be suppressed accordingly. A coagulation of the built up ink is prevented from staining a printing head and the printing paper.

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#### CLAIMS

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[Claim(s)]

[Claim 1] The head mechanical component to which are the airline printer which  
carries out the regurgitation of the ink on print media using the print head in  
which two or more nozzles which carry out the regurgitation of the ink droplet

were prepared, and drive at least the part of said two or more nozzles, and the regurgitation of ink is made to perform, It has the platen which supports said print media so that said two or more nozzles may be faced. Said platen It is the airline printer which has a slot for catching the ink breathed out by the outside of the edge of said print media, and is characterized by equipping said airline printer with the ink suction device for attracting ink from said slot further.

[Claim 2] It is the airline printer which has the side slot of a pair where said slot was established in the location of the both ends of the main scanning direction of said print media by having the horizontal-scanning mechanical component which is an airline printer according to claim 1, drives at least one side of said print head and said print media, and performs horizontal scanning further, and the vertical-scanning mechanical component which drives said print media in the intervals of said horizontal scanning in the direction of said horizontal scanning, and the direction at which it crosses, and performs vertical scanning.

[Claim 3] It is an airline printer according to claim 2. Said platen Furthermore, the upstream slot established in the location which faces the nozzle located in the edge of the upstream of the direction of said vertical scanning at least among said two or more nozzles, It is the airline printer with which it has the downstream slot established in the location which faces the nozzle located in the edge of the downstream of the direction of said vertical scanning at least among said two or

more nozzles, and said ink suction device can attract ink from said upstream slot and said downstream slot, respectively.

[Claim 4] It is an airline printer with possible being an airline printer according to claim 3, said ink suction device being classified so that, as for said upstream slot, said downstream slot, and said side slot, each can be attracted according to an individual, and said ink suction device choosing at least one of them, and attracting ink from said upstream slot, said downstream slot, and said side slot.

[Claim 5] An airline printer equipped with the ink suction control section which is an airline printer according to claim 4, and controls said ink suction device in order to attract ink from said determined slot while determining further whether ink is breathed out by which slot among said upstream slots, said downstream slots, and said side slots in the real time.

[Claim 6] It is the printing approach which carries out the regurgitation of the ink on print media using the print head in which two or more nozzles which carry out the regurgitation of the ink droplet were prepared. The process for which the platen which has a slot for catching the ink breathed out by the outside of the slot of said print media, and supports said print media is prepared, The printing approach characterized by having the process to which drive at least the part of said two or more nozzles, and the regurgitation of ink is made to carry out, and the process which attracts ink from said slot.

[Claim 7] It is a computer program for controlling the airline printer which carries out the regurgitation of the ink on print media using the print head in which two or more nozzles which carry out the regurgitation of the ink droplet were prepared. Said airline printer With the head mechanical component to which drive at least the part of said two or more nozzles, and the regurgitation of ink is made to perform, while supporting said print media so that said two or more nozzles may be faced The platen which has the slot divided into the plurality for catching the ink breathed out by the outside of the edge of said print media, It has the ink suction device in which ink can be attracted, from each of the slot divided into said plurality. Said computer program The computer program which makes said airline printer realize the function to determine in the real time whether ink is breathed out by which slot, and the function which controls said ink suction device in order to attract ink from said determined slot among the slots divided into said plurality.

[Claim 8] The record medium which recorded the computer program according to claim 7 and in which computer reading is possible.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the technique which prints to the edge of a print sheet about the technique which forms a dot on a record medium using the print head, without soiling a platen especially.

[0002]

[Description of the Prior Art] In recent years, as an output unit of a computer, the printer which carries out the regurgitation of the ink from the nozzle of the print head has spread widely, and the printer which can print an image to the edge of a print sheet is also realized. The approach of absorbing the ink breathed out by the outside of the edge of a print sheet with an ink absorber as one of the approaches which realizes such printing is proposed. The slot of the platen which supports a print sheet in the case of printing is equipped with this ink absorber, and it has prevented the dirt of the platen in the ink breathed out by the outside of the edge of a print sheet.

[0003]

[Problem(s) to be Solved by the Invention] However, an absorber may fully be unable to absorb the ink breathed out by the outside of the edge of a print sheet. In this case, ink may solidify and accumulate on the ink absorber with which the slot of a platen was equipped. This deposited ink contacts the print sheet which

passes through a print head and platen top, and becomes the cause which soils this. Especially the pigment ink that used the pigment for color material had the problem of being easy to produce such deposition.

[0004] This invention is made in order to solve the above-mentioned technical problem in the conventional technique, and it aims at offering the technique which controls deposition in the ink absorber of the ink solidified when printing to the edge of a print sheet.

[0005]

[The means for solving a technical problem, and its operation and effectiveness]

In order to solve a part of above-mentioned technical problem [ at least ], the airline printer of this invention The head mechanical component to which are the airline printer which carries out the regurgitation of the ink on print media using the print head in which two or more nozzles which carry out the regurgitation of the ink droplet were prepared, and drive at least the part of said two or more nozzles, and the regurgitation of ink is made to perform, It has the platen which supports said print media so that said two or more nozzles may be faced. Said platen It has a slot for catching the ink breathed out by the outside of the edge of said print media, and said airline printer is characterized by having an ink suction device for attracting ink from said slot further.

[0006] In this invention, since the slot established in the platen is equipped with

the ink suction device for attracting ink in order to receive the ink breathed out in addition to on print media, deposition in the ink absorber of the solidified ink can be controlled. Consequently, the congelation of deposited ink can prevent soiling the print head and a print sheet.

[0007] It has the horizontal-scanning mechanical component which drives at least one side of said print head and said print media, and performs horizontal scanning, and the vertical-scanning mechanical component which drives said print media in the intervals of said horizontal scanning in the direction of said horizontal scanning, and the direction at which it crosses, and performs vertical scanning, and you may make it said slot have the side slot of a pair established in the location of the both ends of the main scanning direction of said print media in the above-mentioned print control unit.

[0008] If it carries out like this, deposition of the ink which separated from the both-sides edge of print media, and fell to the slot can be controlled.

[0009] In the above-mentioned print control unit said platen Furthermore, the upstream slot established in the location which faces the nozzle located in the edge of the upstream of the direction of said vertical scanning at least among said two or more nozzles, It has the downstream slot established in the location which faces the nozzle located in the edge of the downstream of the direction of said vertical scanning at least among said two or more nozzles. Said ink suction

device It is desirable to enable it to attract ink from said upstream slot and said downstream slot, respectively.

[0010] If it carries out like this, deposition of the ink which separated from the tip and the back end of a print sheet, and fell to the slot can be controlled.

[0011] in the above-mentioned print control unit, said ink suction device is classified so that, as for said upstream slot, said downstream slot, and said side slot, each can be attracted according to an individual, and from said upstream slot, said downstream slot, and said side slot, said ink suction device chooses at least one of them, and attracts ink -- possible -- making -- a thing is desirable.

[0012] If it carries out like this, there is an advantage that the field attracted at once can be narrowed for example, and a suction force can be enlarged.

[0013] In the above-mentioned print control unit, while determining further whether ink is breathed out by which slot among said upstream slots, said downstream slots, and said side slots in the real time, in order to attract ink from said determined slot, it is desirable to have the ink suction control section which controls said ink suction device.

[0014] If it carries out like this, only when ink may reach each slot, there is an advantage that ink can be attracted, for example.

[0015] In addition, this invention is realizable with various gestalten, such as a computer program for making a computer realize the function of airline printers,

those approaches, or equipment, a record medium which recorded the computer program, and a data signal embodied in the subcarrier including the computer program.

[0016]

[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained in order of the following based on an example.

A. The sequence of configuration: C. ink suction which is the outline: B. airline printer which is an operation gestalt : D. modification : [0017] A. The outline of an operation gestalt : drawing 1 is the schematic diagram of the ink suction device prepared in the slot of a platen. The print head (not shown) for carrying out the regurgitation of the ink on print media P is arranged at the print media P bottom. The platen 26 which supports print media P in the location where two or more nozzles which this print head has face the print media P bottom is arranged. In addition, print media also calls it a print sheet.

[0018] In order to catch the ink droplet breathed out around print media P, the slot 126 is established in the platen 26. In this slot 126, the ink absorber 127 for absorbing the ink which reached the slot 126 is embedded. Space is prepared between the inferior surface of tongue (not shown) of the ink absorber 127, and the bottom of a slot 126. Let this space be a closed space by pasting up between the perimeter of the ink absorber 127, and slots 126. The hole which is

penetrated toward the background (opposite side of print media P) of a platen 26 and which is not illustrated is prepared in the bottom of a slot 126. The hose 220 of the ink suction device 200 is combined with this hole.

[0019] The ink suction device 200 is equipped with the hose 220 and the pump roller 230. The pump roller 230 has two small rollers 232,234 near the periphery section. The hose 220 is twisted around the perimeter of these two small rollers 232,234. If it drives on a paper feed motor (it mentions later) and the pump roller 230 rotates in the direction of arrow-head A, the air in a hose 220 will be pushed with the small roller 232,234. Thereby, the air in the closed space formed at the inferior surface of tongue of the ink absorber 127 and the bottom of a slot 126 is exhausted. Consequently, the ink breathed out by the upper part of the ink absorber 127 is attracted. This ink is discharged by the waste ink discharge section which is not illustrated through a hose 220.

[0020] In the example of this invention, since the ink breathed out on the ink absorber 127 is attracted using an ink suction device, deposition of the solidified ink to the ink absorber 127 with which the slot 126 of a platen 26 was equipped can be controlled. Consequently, the ink deposited on the ink absorber 127 can prevent contacting print media P and soiling. Moreover, deposited ink can also prevent adhering to the print head 28 and soiling print media P.

[0021] In addition, "the outside of the edge of print media" in a claim is near the

edge of print media, and means the outside of the field of print media. Moreover, when not only the outside of the periphery of print media but print media has a hole, the inside of the periphery of the hole is also included.

[0022] B. The configuration of an airline printer : drawing 2 is the outline block diagram of a color printer 20. The vertical-scanning mechanical component to which a color printer 20 conveys a print sheet P in the direction of vertical scanning by the paper feed motor 22, The horizontal-scanning mechanical component which makes carriage 30 reciprocate to the shaft orientations (main scanning direction) of the paper feed roller 25 by the carriage motor 24, The head drive which drives the print head unit 60 (it is also called the "print head aggregate") carried in carriage 30, and controls the regurgitation of ink, and dot formation, It has the control circuit 40 which manages an exchange of a signal with these paper feed motors 22, the carriage motor 24, the print head unit 60, and a control panel 32. The control circuit 40 is connected to the computer 90 through the connector 56. In addition, a control circuit 40 also has a function as a head mechanical component in a claim.

[0023] The vertical-scanning mechanical component which conveys a print sheet P is equipped with the gear train which transmits rotation of the paper feed motor 22 to the paper feed roller 25 and the pump roller 230 (illustration abbreviation). The gear train which transmits rotation of the paper feed motor 22

to the pump roller 230 is equipped with the clutch which turns on / turns off this transfer. Moreover, the horizontal-scanning mechanical component which makes carriage 30 reciprocate is equipped with the pulley 38 which stretches the endless driving belt 36, and the position sensor 39 which detects the home position of carriage 30 between the sliding shaft 34 which is constructed in parallel with the shaft of the paper feed roller 25, and holds carriage 30 possible [ sliding ], and the carriage motor 24.

[0024] Drawing 3 is the explanatory view showing the array of the ink jet nozzle Nz in the print head 28. Arrangement of these nozzles consists of 6 sets of nozzle arrays which carry out the regurgitation of the ink for black (K), cyanogen (C), and light (cyanogen LC) (Magenta M) light MAZENDA (LM) (Hierro Y) each color of every, and is arranged by the single tier in the nozzle pitch k with 48 fixed nozzles, respectively. In addition, a "nozzle pitch" is a value which shows a part for what raster (a part for namely, what pixel) spacing of the direction of vertical scanning of the nozzle allotted on the print head is. For example, the pitch k of the nozzle which opens spacing for three rasters in between, and is allotted is 4.

[0025] Drawing 4 is the decomposition perspective view of the platen 26 in the example of this invention. The platen 26 shown in drawing 4 (a) mainly consists of a platen frame 125 equipped with a slot 126, an ink absorber 127, and an ink

absorber supporter 128, as shown in drawing 4 (b) - (d). The ink absorber 127 is formed by the sponge material of the porosity for absorbing ink. In addition, in order to make it intelligible, the ink absorber supporter 128 makes the upper and lower sides reverse, and is shown.

[0026] The platen frame 125 is equipped with the slot 126 for catching the ink droplet which was not breathed out on print media P. The pore which is penetrated at the pars basilaris ossis occipitalis of this slot 126 on the background of the platen frame 125 and which is not illustrated is prepared in at least one place. The ink absorber supporter 128 makes the upper and lower sides reverse from the condition shown in drawing 4 (b), and is inserted in a slot 126. The ink absorber 127 is inserted in the upper part of the inserted-in ink absorber supporter 128. Moreover, in order to secure the confidentiality of the ink absorber 127 lower part, the perimeter of the ink absorber 127 is pasted up on the platen frame 125. Thus, the sealing section is formed in the ink absorber 127 lower part. This sealing section is divided into four with the slot. About this detail, it mentions later.

[0027] Drawing 5 is the sectional view of a platen 26 showing the principle by which ink is attracted. Since the ink absorber 127 is supported with the ink absorber supporter 128, the sealing field is formed in the lower part. Since internal air is sucked out by the ink suction device 200, this sealing field serves

as low voltage. Consequently, the interior of the ink absorber 127 which is porous sponge material also serves as low voltage.

[0028] The ink droplet lp breathed out from the print head 28 adheres to the upper part of the ink absorber 127 which is porous sponge material. Since the interior of the ink absorber 127 serves as low voltage, the adhering ink droplet lp is absorbed by the ink absorber 127, and falls to pars-basilaris-ossis-occipitalis 126b of a slot 126. And it is drawn in by the hose 220 of the ink suction device 200, and is discharged by the waste ink discharge section which is not illustrated. Thus, the platen 26 has structure which can discharge the ink breathed out out of the print sheet.

[0029] C. The sequence of ink suction : drawing 6 is the explanatory view showing the partition of a platen 26 and the detail of the ink suction device 200 in the example of this invention. As mentioned above, the slot 126 is classified into 126f of upstream slots, downstream slot 126r, and 126s of two side slots. The hose 220 of the ink suction device 200 is connected to each of this classified slot. Since the bulbs V1-V3 controlled by the control circuit 40 are formed in each of a hose 220, from one of the classified slots, the ink suction device 200 can choose at least one of them, and can attract ink.

[0030] Drawing 7 is a flow chart which shows the sequence of ink suction. At step S101, a user sets up a FUCHI-less print mode in the print mode setting

screen which is not illustrated on the monitor of a computer 90 ( drawing 2 ). A FUCHI-less print mode is a print mode which prints even at the edge of print media P. In this print mode, the ink droplet which separated from the edge of print media P is breathed out by the slot 126 of a platen 26. Moreover, if a user sets up FUCHI-less printing, the clutch which transmits rotation of the paper feed motor 22 to the pump roller 230 will serve as ON. Thereby, the driving shaft of the paper feed motor 22 ( drawing 2 ) is connected to the ink suction device 200. In addition, since a bulb V0 ( drawing 6 ) is opened in this case, the hose 220 is released by atmospheric air.

[0031] Thus, in this example, in a setup of a print mode, if FUCHI-less printing is set up, it will be in the condition that the ink suction device 200 can operate. However, the setting approach of operation is not restricted to such an approach. For example, the ink suction device 200 is good also as what always operates, and may be set up with what operates only when using pigment ink especially with much deposition of ink. In addition, in this example, although the paper feed motor 22 is used for the drive of the ink suction device 200, the exclusive motor for ink suction device 200 may be formed.

[0032] At step S102, the paper feed motor 22 starts a drive and vertical-scanning delivery of print media P starts. Although the pump roller 230 connected to the paper feed motor 22 also rotates at this time and the ink suction device 200

operates, air is inhaled through a bulb V0 at this time. Thus, when ink is not breathed out by the slot 126, the load of the paper feed motor 22 is reduced by considering the hose 220 connected to the ink suction device 200 as atmospheric-air release. If the paper feed of print media P is started and fixed time amount passes, the tip of print media P will arrive at the upper part of downstream slot 126r (step S103).

[0033] Drawing 8 is the explanatory view showing the situation of the paper feed of a print sheet P. In drawing 8 (a), the print sheet P is held and sent to the upstream paper feed rollers 25a and 25b (vertical-scanning delivery), and the tip Pf passed through 126f top of upstream slots, and has resulted on opening of downstream slot 126r. At this time, in order to print the tip Pf of a print sheet P, the ink droplet Ip is already breathed out from the print head 28. Thus, since the regurgitation of ink is started when the tip Pf of a print sheet P is in the upstream rather than nozzle #1, even if there are some paper feed errors, an image can be printed to an edge, without making a margin in the front end section Pf of a print sheet P. The ink droplet which did not reach a print sheet P reaches ink absorber 127r of the downstream.

[0034] At step S104, suction of ink is started from downstream slot 126r. This is performed by opening a bulb V1 while a control circuit 40 closes a bulb V0 ( drawing 6 ). The timing of closing motion of these bulbs may be determined

according to the vertical-scanning feed per revolution of for example, the print media P, and may be determined according to the field (for example, timing which prints the tip Pf of a print sheet P) of a printing image. In addition, it is good also as a sequence which also opens a bulb V2 ( drawing 6 ) to coincidence in this case. If it carries out like this, the ink breathed out by 126s of side slots can also be attracted. However, the suction force of downstream slot 126r will decline. Thus, a control circuit 40 functions also as an "ink suction control section" in a claim.

[0035] If paper feed is furthermore performed, the tip Pf of print media P will pass through the opening top of downstream slot 126r (S105). If the tip Pf of print media P passes through the opening top of downstream slot 126r, the regurgitation of the ink droplet to downstream slot 126r will be lost. All the ink breathed out on opening of downstream slot 126r is because a print sheet P is reached.

[0036] At step S106, suction from downstream slot 126r is stopped, and suction from 126s of side slots is started. This is performed when a control circuit 40 closes a bulb V1, while opening a bulb V2. As shown in drawing 8 (b) at this time, the ink droplet which separated from the both sides of print media P is caught by 126s of side slots.

[0037] If paper feed is furthermore performed, the back end Pr of print media P

will reach on opening of 126f of upstream slots (S107). If the back end Pr of print media P reaches on opening which is 126f of upstream slots, the regurgitation of a 126f [ of upstream slots ] ink droplet will start.

[0038] At step S106, suction from 126s of side slots is stopped, and suction from 126f of upstream slots is started. This is performed when a control circuit 40 closes a bulb V2, while opening a bulb V3. At this time, as shown in drawing 8 (c), the ink droplet which separated from the back end Pr of print media P is caught and attracted at 126f of upstream slots.

[0039] If paper feed is furthermore performed, the back end Pr of a print sheet P will pass through the opening top of 126f of upstream slots (S109). If the back end section of a print sheet P passes through the opening top which is 126f of upstream slots, the regurgitation of a 126f [ of upstream slots ] ink droplet will be lost. This reason is that the regurgitation of the ink by the nozzle on opening of 126f of upstream slots is stopped since printing to the back end Pr of a print sheet P was completed.

[0040] At step S110, suction from 126f of upstream slots is stopped, and suction of ink is completed. This opens a bulb V0, a control circuit 40 makes it an atmospheric-air release condition, and it is carried out by closing a bulb V3. Then, a halt of vertical-scanning delivery of print media P also stops the pump of the ink suction device 200 in connection with this. After suction from 126f of

upstream slots stopping, it may be made to attract the ink from 126s of side slots.

[0041] Thus, in this example, although the ink droplet of the slots 126 classified into four is breathed out, since it can be drawn in, ink can be attracted efficiently. However, the sequence of ink suction is not restricted to this approach. For example, suction actuation of ink may be performed for every page, and you may carry out for every job. Moreover, the slot 126 does not necessarily need to be divided.

[0042] D. modification: -- the range which this invention is not restricted to an above-mentioned example or an above-mentioned operation gestalt, and does not deviate from that summary in addition -- setting -- various voice -- it is possible to set like and to carry out, for example, the following deformation is also possible.

[0043] Although the slot established in the platen has the rectangular configuration in the above-mentioned example, the configuration of a slot is not restricted to a rectangle. One linear slot extended to a main scanning direction is [ that what is necessary is just to have the configuration which can catch the ink breathed out by separating from the edge of a print sheet ] sufficient as a slot.

[0044] Moreover, it is not necessary to necessarily perform suction of ink from the whole slot for example, and you may make it draw in only from the slot of a part with much discharge quantity of ink.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] The schematic diagram of the ink suction device prepared in the slot of a platen.

[Drawing 2] The explanatory view showing the configuration of a printer.

[Drawing 3] The explanatory view showing the array of the ink jet nozzle Nz in the print head 28.

[Drawing 4] The decomposition perspective view showing the outline of the platen 26 in the example of this invention.

[Drawing 5] The sectional view showing the outline of a platen 26 which shows the principle by which ink is attracted.

[Drawing 6] The explanatory view showing the partition of a platen 26 and the detail of an ink suction device in the example of this invention.

[Drawing 7] The flow chart which shows the sequence of ink suction.

[Drawing 8] The explanatory view showing the situation of the paper feed of print media P.

### [Description of Notations]

20 -- Color printer

22 -- Paper feed motor

24 -- Carriage motor

25 -- Paper feed roller

25a, 25b -- Upstream paper feed roller

26 -- Platen

28 -- Print head

30 -- Carriage

32 -- Control panel

34 -- Sliding shaft

36 -- Driving belt

38 -- Pulley

39 -- Position sensor

40 -- Control circuit

56 -- Connector

60 -- Print head unit

90 -- Computer

125 -- Platen frame

126f -- Upstream slot

126r -- Downstream slot

126s -- Side slot

127 -- Ink absorber

128 -- Ink absorber supporter

200 -- Ink suction device

220 -- Hose

230 -- Pump roller

232,234 -- Smallness roller